

## REMARKS

In view of the above amendments and the following remarks, reconsideration of the rejections contained in the Office Action of April 7, 2008 is respectfully requested.

By this Amendment, claims 1-5, 7-9, 11, 12, 14-26 and 31-34 have been amended. Thus, claims 1-34 are currently pending in the application. No new matter has been added by these amendments.

Revisions have been made to the specification and abstract, as indicated above. No new matter has been added by the revisions. Entry of the amendments to the specification and abstract is thus respectfully requested.

On page 2 of the Office Action, the Examiner rejected claim 33 under 35 U.S.C. § 112, second paragraph, as being indefinite. In particular, the Examiner asserted that the phrase “the domain inversion surface area” lacks antecedent basis. Further, with regard to the phrase “spontaneous polarization,” the Examiner indicated that it is unclear how the spontaneous polarization is measured and what the units are for such a measurement. In order to address this rejection, it is first noted that claim 33 has been amended to include proper antecedent basis for the phrase “domain inversion surface area.” Further, it is noted that one of ordinary skill in the art would understand how spontaneous polarization is measured, as well as the units for spontaneous polarization. Accordingly, it is respectfully submitted that the Examiner’s formal rejection under § 112 is not applicable to amended claim 33.

On pages 3-5 of the Office Action, the Examiner rejected claims 1-12, 14-28, 30-32 and 34 under 35 U.S.C. § 102(b) as being anticipated by Gupta et al. (US 5,756,263). On pages 5-6 of the Office Action, the Examiner rejected claims 13 and 29 under 35 U.S.C. § 103(a) as being unpatentable over Gupta. For the reasons discussed below, it is respectfully submitted that the amended claims are clearly patentable over the prior art of record.

Amended independent claim 1 recites an optical element which includes a single-polarized ferroelectric substrate, and a plurality of domain inversion regions formed in the ferroelectric substrate, with the domain inversion regions extending in a thickness direction of the substrate. The optical element of claim 1 also includes *grooves formed on a surface of the ferroelectric substrate between the domain inversion regions, respectively, such that a portion of*

*each of the domain inversion regions protrudes from the surface of the substrate in the thickness direction.* Further, claim 1 recites that a depth  $T'$  of at least one of the domain inversion regions satisfies a relation  $T' < T$  with respect to a substrate thickness  $T$ .

Amended independent claim 14 recites a method for forming domain inversion regions in an interior of a single-polarized ferroelectric crystal substrate. The method of claim 14 includes comprising *forming grooves on a surface of the ferroelectric substrate so as to divide the surface of the ferroelectric substrate into a plurality of regions between the grooves*, respectively. Claim 14 also recites applying an electric field to the plurality of regions to form domain inversion regions, wherein a direction of the electric field is a direction facing a direction of spontaneous polarization of the ferroelectric substrate, and that the applying of the electric field to the plurality of regions produces a potential difference in the plurality of regions.

Gupta discloses a substrate 10 having domain inversion regions. However, Gupta does not disclose an optical element having *grooves formed on a surface of the ferroelectric substrate between the domain inversion regions, respectively, such that a portion of each of the domain inversion regions protrudes from the surface of the substrate in the thickness direction*, as required by independent claim 1.

In this regard, it is noted that on page 3 of the Office Action, the Examiner indicates that the grooves 27 in Figs. 5A-B of Gupta correspond to the grooves of the present invention. However, Gupta discloses that electrodes 28a are placed in the grooves 27 in order to cause polarization reversal in localized regions. Thus, Gupta does not disclose grooves formed on a surface of the ferroelectric substrate between the domain inversion regions, respectively, such that a portion of each of the domain inversion regions protrudes from the surface of the substrate in the thickness direction, as required by claim 1, because Gupta discloses that the electrodes 28a are arranged in the grooves to cause polarization reversal in localized regions.

Similarly, Gupta does not disclose a method for forming domain inversion regions which includes forming grooves on a surface of the ferroelectric substrate so as to divide the surface of the ferroelectric substrate into a plurality of regions between the grooves, and applying an electric field to the plurality of regions to form domain inversion regions, as required by independent claim 14.

Therefore, it is respectfully submitted that independent claims 1 and 14, as well as claims 2-13 and 15-34 which depend therefrom, are clearly allowable over the prior art of record.

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is clearly in condition for allowance. An early notice to that effect is respectfully solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, the Examiner is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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